Cosmic or microwave background

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Abstract

A hypothesis is that in cosmic background, primordial photon lattice where emerges a way to empirical mass conservation, a photon was disturbed to create a spin then lead to its neighbors one by one raining -- microwave background radiation -- into this a small ripple, which poles apart spin directions pointing to a world was made of matter or antimatter. Now cosmos looks like a bigger and bigger hole in photon lattice that can serve as an isotropic gravity reference system seemingly influencing on everything. As a result, virtual inertia will become more real.

Key word: cosmos, CMB, photon lattice, antimatter, inertia

1. Introduction

Cosmic microwave background radiation[1] (CMB or CMBR) is critical to any proposed model of universe. Background in first phrase notably in here defines to surround cosmos that its location and meaning will alter in different cosmic models. Among them prevailing two are big bang[2] and steady state[3] that in the former CMB is a past hotter and future colder

relic

and

scattered star light from distant galaxies[4]

in the latter.

However, cosmic surrounding has not been involved in the both them that was inseparable of cosmos and its environment here, which mostly in concept instead of detail describes CMB, an imbalance of matter and antimatter, and inertia in this model. It is called “small ripple” that appeared some features of the both. That is, it is partly similar to the former having a start point, but violent replaced by steady that not only sounding like the latter but matters could be incessantly supplied for it to keep invariant mass density that a gap was how to create new matters in cosmic inflation[5], which seems easier to fit in with CMB that perhaps a unique and clear messenger comes from outside of universe.

2. Cosmos

To discuss cosmos a first challenge is that whether it is infinite or not. Cosmos in small ripple model was finite, although its size is unclear. Beyond cosmic edge was its background, a primordial world different from observable universe (mass ~ 10^{50} kg) that is an infinite photon lattice (PL) in Euclidean 3-space, which is somewhat akin to

an infinite lattice of fermions in Big Bang lattice model[6]

and a diamond crystal lattice that roughly regarding without any motions (Fig. 1 and Table 1). In addition, PL is, as Epicurus (341–270 BC) wrote that:

the totality of things was always such as it is now, and always will be,[7]

which was in coincidence with the law of mass conservation[8], known as mass can neither be created nor destroyed, that previous was empirical or without root.

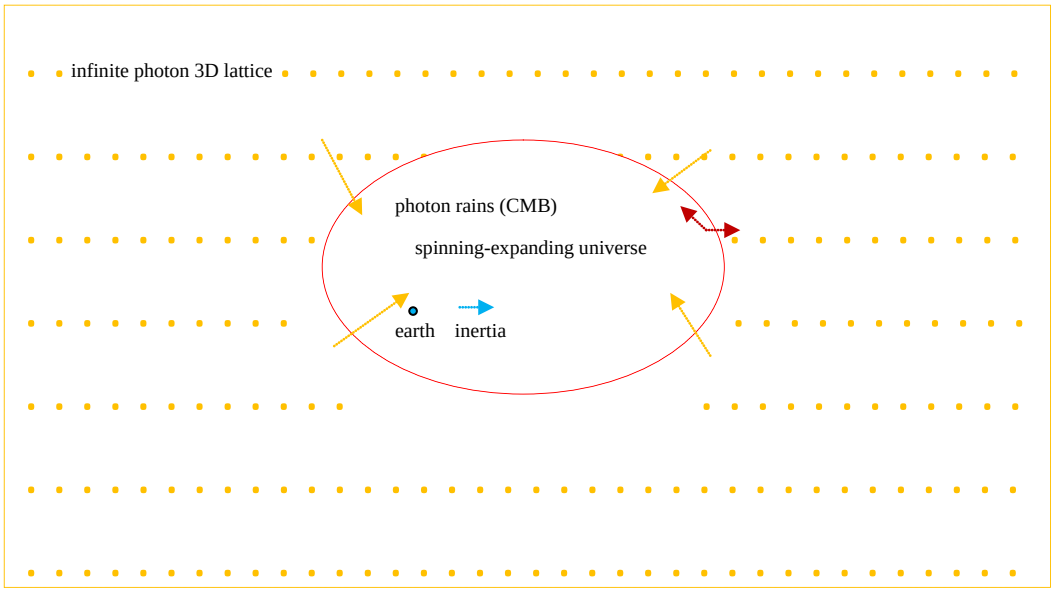

Fig. 1 Islet universe bathing in photon rains

CMB[1] rains can carry masses into cosmic vortex (a referable speed is ~ 600 km/s)[22] that a direction implied a result, matter or antimatter[33]; and perhaps PL exerts an isotropic gravitational field on cosmic hole, in it earth will move to right if no other forces[45], which made more real sense of inertia[44] than ever.

Cosmos in Fig. 1 was imagined in PL that one photon[9] (photon-1, cosmic seed) was disturbed to create a spin then give rise to nearby photons consecutively avalanching into this a small ripple singularity, after that more and more bigger-flatter that seems accelerating[10,11]. In other words, universe was like a small ripple in a photon sea, or, it looks as a snowball rolling on a snowfield

(*a continuous "slow-roll"*),[12]

illustrating that cosmos is of “sustainable development”.

In the late-1980s, when I learn about CMB with anisotropy[13] a first response was it comes from outside of universe, because earth can’t be in centre of universe[14]. Less than perfect is that in Fig. 1 universe was an oblate, an ideal black body corresponding to CMB radiation spectrum[15], but CMB has given a snapshot approximately flat[16] (anisotropy or directional dependency), as a conclusion:

> *Nevertheless, this should not prevent us from undertaking such searches, since any detection of anomalies in the polarized sky signal will inevitably take us beyond the standard model of cosmology*.[17]

A reason is likely that CMB photon rains can stir a small ripple to form a vortex, a little akin to

Vortex Formation in a Stirred Bose-Einstein Condensate[18]

or

phantom propellers,[19,20]

i.e., cosmos may own a spin, corresponding to a hint that

its (CMB) polarization may be rotated by exotic effects,[21]

that its speed could be able to affect its sphere shape. Also some works indicate that

earth velocity relative to CMB

(a rest frame of cosmic black - body radiation, or PL, an outer reference frame)

was ~ 600 km/s,[22,23]

which does is cosmic spin speed now difficult to judge, as too much factors (known and unknown) will be involved.

In addition, due to this spin CMB photons will faintly appear not only red shift in one direction but blue shift in inverse direction (Fig. 1, Doppler effect), which is well consistent with observed dipole temperature distribution in CMB that an alternative explanation can refer to a study[24]. Moreover, because of a spin happening, cosmos should emerge a faint differentiable centre and edge (big bang also having, at least on theory), despite no clear clues up to now, and to the knowledge of the author, it is unclear that how to estimate a CMB temperature (~ 2.7K), Hubble's Law and cosmic age (~ 1.4×10^{11} y).

On the other side, due to occurrence of CMB photon rains that carried huge masses, mass density

of PL and universe were equal and constant. That is, decreasing mass and volume of PL will equal to of increasing of universe. Surely, different places will be less dense or denser in universe compared with PL. Cosmic average density[25] is ~ 4.5×10^{-31} g/cm^3 or about one proton / m^3, which might also be a mass density range of PL, implying that here disagrees with big bang theory that cosmic mass density will be lower and lower as time passing or say

eternal inflation in fact cannot be eternal,[26]

if not have supply. Mass is a value of that how much matters contains, what we known have two types: ordinary and anti matters that is one of the great unsolved problems in physics.

Table 1 Disparities between photon lattice and universe

	photon lattice	universe
space, mass, field	infinite, homogeneous	finite, heterogeneous
time, motion, direction	without	with

> The content is a bit similar to or different from that: *If the world has begun with a single quantum, the notions of space and time would altogether fail to have any meaning at the beginning; they would only begin to have a sensible meaning when the original quantum had been divided into a sufficient number of quanta. If this suggestion is correct, the beginning of the world happened a little before the beginning of space and time*.[2] That "different from" means without "soil" for growth of *a single quantum* seed.

3. Matter or antimatter

An asymmetry[27,28] is that why our world is made of ordinary matter rather than anti matter[29-32] (anti particle[33], also occurs in ordinary matter) that generally is attributing to *CP violation*[34], which

anti particle / ordinary particle ratio[35] *is* $< 1\%$

at any rate in primary cosmic rays[36,37] (~ $10^9 - 10^{20}$ eV) that origin still remains a mystery. One of possibilities is that a cosmic (photon-1) vortices directions (↑↓) determined a world was ordinary matter ($n \rightarrow p^+ + e^- +?$) or antimatter ($n \rightarrow p^- + e^+ +?$, in an anti universe, if happen) that

> *satellite-based searches of cosmic rays for anti deuteron and anti helium particles have yielded nothing*.[38]

Namely,

left → ordinary matter : antimatter ← right,

for example, or vice versa, implying that there may have a subtle relationship between a gravitational field of PL and an asymmetric structure of particles (atoms) in spinning universe, a

bit corresponding to that

> *using the once popular vortex theory of gravity, the possibility of matter with negative gravity was discussed by William Hicks in the 1880s.*[35]

At the same time, there raises a question that whether all of photons now in our cosmos will follow photon-1 direction to spin, which is unacceptable, or not? However, cosmos seems similar to a big atom that everything was to interact with one another in it.

Here a thought for a long time is that all particles are composite except photon, i.e., all objects (dark mass-energy now was elusive that visible and dark mass-energy ratio[39] is ~ 1 / 9) in cosmos were made up of photons that a photon mass must be $>$ 0 eV simply according to $E = mc^2$, though for intuition, its structure and property (e.g. particle-wave duality) have not been fully recognized so far.

Cosmic visible matters most are chemical elements that consist of fundamental particles, which a possible process is:

$$2\gamma \rightarrow e^+ + e^- \rightarrow n \rightarrow p^+ + e^- + ?.$$

About origin of chemical elements currently is based on big bang[40,41] and steady state[42] theories, in where Wikipedia is:

1. *The two lightest elements, hydrogen and helium, were mostly formed in the Big Bang and are the most common elements in the universe.*
2. *The next three elements (lithium, beryllium and boron) were formed mostly by cosmic ray spallation, and are thus rarer than those that follow.*
3. *Formation of elements with from 6 to 26 protons occurred and continues to occur in main sequence stars via stellar nucleosynthesis. The high abundance of oxygen, silicon, and iron on Earth reflects their common production in such stars.*
4. *Elements with greater than 26 protons are formed by supernova nucleosynthesis in supernovae, which, when they explode, blast these elements as supernova remnants far into space, where they may become incorporated into planets when they are formed.*

That is, it is divided into 4 steps. Nonetheless here could simply be divided into 2 steps:

1. Photons constitute electrons, positrons and nucleons then up to H and He atoms (Z 1-2), which created nebulae to form various objects in sky.
2. All rest (Z 3-82) of elements might result mainly from fission (decay) products of super heavy elements ($Z > 82$).

although structures of fundamental particles remains need to further clarify. In addition, a promising and clearer nuclear structure of Z 1-118 elements is shown in a paper[43] that provided a probably indicative way helpful to take apart the origin of elements, which all elements to take shape an object own a mysterious phenomenon: inertia.

4. Inertia

In daily life, we often feel puzzled from past up to now (e.g. Aristotle, Mach, etc.) on that why an object has inertia[44] remaining able to move that seems unable to find out its source, where may be in out of universe. Inertia in Newton's first law is:

> *an object either remains at rest or continues to move at a constant velocity, unless acted upon by a force*,[45]

which is in an open space without a "background" or an appropriate reference frame that physicists long look for in mechanics, especially Einstein, and inertia in Einstein' theory is:

> *the gravitational coupling between matter and spacetime*.[46]

It will enable ordinary people dim or hard to understand. Here attempts to add cosmic surroundings

> (*matter there influences inertia here*)[47]

forming a closed space

> (*with appropriate boundary conditions of closure*),[48]

i.e., an isotropic (resultant force was zero) gravitational field (like enabling someone to recall ether) of PL that also is a simplest reference frame in agreement with that

> *the idea that the nature of local physical laws is affected by the state of the whole universe*[49]

or

> *local physical laws are determined by the large-scale structure of the universe*.[50]

Now assuming universe in Fig. 1 was absolute void, without any other celestial bodies, Newton's first law could be modified into:

> In an isotropic gravity reference system, *an object* (earth) *rest or motion remains, if without external forces,*

or

> Momentum is conservation in zero gravity field,

which appears easier to tell that inertia (linear or nonlinear) is gravity, but not of earth or any

others in universe. Accordingly, weak equivalence principle roughly is

$$\text{gravitational (local, part)} \quad \approx \quad \text{inertial (global, whole) mass,}^{51}$$

which a difference between them[52] is ~ 10^{-12} that can't say equivalence at least now.

In spite of this significant improvement, it seems that a hid deeper root of inertia has not been spotted yet, perhaps, completely to resolve it need to wait an emergence of "a theory of everything" that any theory might be a temporary before it. For example, various kind forces only is one in different scales show, such as that gravity and van der Waals forces[53,54] may be a difference of that, if opposite charges attraction was very faintly larger than like charges repulsion, i.e.:

$$e^+ \rightarrow\leftarrow e^- \quad \geq \quad e^- \longleftrightarrow e^- \text{ or } e^+ \longleftrightarrow e^+.$$

Now an uncertainty is that the possible faint difference of attraction and repulsion seems able to give rise to an innate energy loss more or less in some physical phenomena, such as perpetual motion machine, time crystal[55-59], natural magnet, superfluidity, superconductivity[60-62] (lifetime ~ 10^5 y) and radioactive decay[63,64] (half life $T_{1/2}$ spanning ~ 10^{-15} – 10^{15} s), which will fade away. Put differently, perpetual motion was possible in the light of energy conservation[65,66] that energy can neither be created nor destroyed.

Incidentally, it is thought that, sometime, whole (induction) is more preferential than part (deduction) to consider a thing when faces a problem how to balance a point between them under a certain condition. In addition, comparatively speaking Newton's theory is "general", while Einstein's one is "special" to some degree to interpret physical phenomena in universe.

5. Problems

As universe expanding, corresponding to receding boundary of PL, no matter big bang and small ripple will inevitably face a problem that CMB photons (~ 6.6 × 10^{-4} eV) are redshifted, causing them to decrease in energy[67], which will no longer be detectable. A relative problem is that will some physical constants change? Includes photon (rains) speed in past small and future big universe, and why is this value, not others? So far, there has no clues to establish a relationship between photon speed c (~ 3 × 10^8 m/s) or speed of gravity[68,69] and acceleration of gravity g (~ 9.8 m/s^2 for earth), it could?

Finally, a problem is that who clicked a big bang or a small ripple of the universe, which seems always to have some problems almost unlikely to answer, even if it is part of a whole. Such as the only universe was fused by many small ones analogous to soap bubbles[70] or

> *apparently, these ripples gave rise to the present vast cosmic web of galaxy clusters and dark matter,*[71]

or exists another similar parallel universe or anti universe, and so on that multiverse[72,73] merely is speculation at this stage. However, here trends to believe that physical fundamental constants are

nearly constant, and to some extent what small ripple described is a multiverse but not inconceivable (Fig. 1), for it does not limits at cosmos itself.

6. Conclusions

In this work, horizon was broadened to cosmic background – photon lattice – where grew out cosmos and then was a source of CMB[1], inertia[44,45], and mass conservation in all likelihood. Also, it implies that a cosmos of ordinary or anti matter[33] might hinge eventually on its critical spin, a possible speed[22] being ~ 600 km/s, direction. To piece together these suggests that small ripple will be able to simplify the present an image of observable world.

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